direction of screw-in have cutting edges which protrude relative to the leading thread blades.

IN THE ABSTRACT:

Please substitute the attached Abstract with the one filed.

REMARKS

Review and reconsideration of the Office Action of April 24, 2002, is respectfully requested in view of the above amendments and the following remarks.

Turning now to the Office Action in greater detail, the paragraphing of the Examiner is adopted.

Paragraph 1 - Restriction (Request for Reconsideration thereof)

The Examiner acknowledges Applicant's election with traverse of Group II, Claims 23-26, and acknowledges that the traversal is on the ground that the inventions are related. The Examiner finds this is not to be persuasive because the article, hip-socket, can be made by another process besides using a lathe. For example the article can be made using a laser or a grinder. The requirement is deemed proper and is therefore made final. Claims 1-22 are withdrawn from consideration.

Applicant respectfully requests reconsideration of the Restriction Requirement on the grounds that:

(a) the presently claimed article is a medical prosthesis with highly complex threading, which cannot be made by laser or other technique, as discussed in the background section of the specification. Grinding, if directed to a fine shape as the present prosthesis, is not materially different from milling.

Accordingly, the Examiner has not shown that the article can be made by a materially different process.

(b) the Examiner apparently considered the elected claims to be drawn to a product, and did not give weight to the process limitations in the product-by-process claims. Nevertheless, since the claims are product-by-process and it is respectfully submitted that the lathing process must be examined in order to examine the claims, all claims can be examined together without undue burden.

(c) if the search and examination of an entire application can be made without serious burden, the examiner must examine it on the merits, even though it includes claims to distinct or independent inventions. In the present case, the Examiner would have to search classes to lathing processes for production of the hip joint socket in the search for the hip joint socket product by process claims, and thus it is respectfully submitted that examination of both sets of claims would not pose a serious burden on the Examiner.

(d) Applicant offered to expressly admit that if the hip joint socket is obvious, then the lathing process would also be obvious. Pursuant to MPEP §803, if there is an express admission that the claimed inventions are obvious over each other within the meaning of 35 U.S.C. 103, restriction should not be required, *In re Lee*, 199 USPQ 108 (Deputy Asst. Comm'r. for Pats 1978).

Accordingly, since a search for the subject matter of claims 1-22 could be carried out concomitantly with the search

for the hip joint socket of claims 23-26, it is respectfully submitted that all claims concern a common invention, and reconsideration of the restriction requirement is again requested.

Paragraphs 2-3 - Specification

The Examiner objects to the abstract of the disclosure because the abstract contains more than one paragraph. Further the abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

In response, a revised Abstract is attached. Should the Examiner maintain the restriction requirement, Applicant will further amend the Abstract to focus on the elected invention.

Paragraphs 4-6 - Claim Rejections - 35 USC §112

Claims 23-26 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 23 and 26 - the phrases "for example", "e.t.c." and "e.g." render the claim indefinite because it is unclear whether the limitation following the phrase are part of the claimed invention.

In response, Applicant has completely revised the elected claims, now presented as new claims 27-41.

U.S. Application No. 09/605,261
AMENDMENT A

Attorney Docket: 3698.008

Paragraphs 7-8 - Claim Rejections - 35 USC §102

Claims 23-26 are rejected under 35 U.S.C. §102(b) as being anticipated by Tuke (US 4,851,006).

Tuke discloses a hip-joint socket with individual threaded blades as is claimed.

Applicants respectfully traverse in view of the claims as now amended to more clearly define the invention.

It is first to be noted that Tuke teaches that the provision of an extensive threading on almost the entire outer surface of the cup is difficult and expensive to manufacture. Tuke does not even begin to discuss the complexity of the various thread profiles, as discussed at length in the present specification. Rather, Tuke merely provides a "minimal amount of screw thread (for example, approximately one turn of thread) which thread is preferably formed only in that region adjacent the edge of the cup" (col. 2, lines 13-15).

The thread of Tuke thus has only a single "rib".

In the present invention, in contrast, the threading on the shell surface defined by ribs, meaning a plurality of ribs.

As disclosed at page 15 of the specification, one attribute of the invention is comprised therein, that for artificial hip joint sockets with a tooth profile which tapers towards the head of the thread tooth, that the thread blades formed between the cutting grooves are produced as so-called screw surfaces (sometimes referred to as screwed surfaces) and to selectively swivel them in their respective direction of extension depending

upon the windup of the cutting groove. In this case screw surfaces are understood to mean those surfaces which are created by the rotation of a certain tooth profile with constant radial distance from the axis of the socket and with a pitch around this axis. In the case of for example trapezoidal tooth profiles this would mean three screw surfaces are formed, one on the head side and two on the lateral sides. In so doing, these screw surfaces can be shortened in their base area along their extension if the tooth profile runs into the surface shell for certain shell geometries of the screw socket. The surfaces which follow the cutter at the start of the respective threaded blade will then have a neutral angle, i.e. neither a pinch nor a relief angle. This then avoids the undesirable pinching effects while at the same time ensuring bone contact on all sides of the threaded blade. In order to enable the cutting edge to have the optimum effect at the start of each respective threaded blade, it must protrude compared with the leading threaded blade. In the first step this is achieved in that a larger radius is selected for the screw surfaces of a following threaded blade than for the screw surfaces of the leading threaded blade. Preferably, the individual threaded blades are swung relative to one another in their extension as a function of the windup of the cutting grooves, whereby the preferred direction of swing is one which approaches the windup angle in order to realise an overstand of the lateral cutting edge with a positive cutting angle.

For further explanation of the invention, the Examiner is referred to Fig. 1 which presents the pole-side view of a hemispherical screw-in socket 1 with a flat thread in accordance with state-of-the-art based on an example with 1.3 magnification. The basic dimensions were selected for technical drawing reasons and are also retained in drawing figures 2 through 4 to allow better comparability. The windup angle of the cutting groove has been set at 0° throughout in order to reduce the drawing work. It is known that a woundup cutting groove offers advantages with respect to a more favourable cutting angle and a more evenly distributed transfer of forces.

In the example according to the invention shown in Fig. 2 of a screw-in socket with a flat thread in accordance with state-of-the-art is produced from screw-in socket 1 by after-milling. In the diagram the base hole 20, the dome area 17, the thread base 19, the nominal diameter 21, the slotting 22, the edges (16) between the threaded blades and the shell body all correspond completely with Fig. 1. The straight outer areas 15 of the individual threaded blades now run as chords to the swing circle of the leading head-side cutting edges in the screw-in direction and in synchronisation with the thread slotting such that relief angles are formed with respect to the respective swing circle. The effect of the cutting edges, of reducing the screw-in forces, is achieved by the circumstance that the radial distance of the cutting edges from the socket axis is always larger than the corresponding radial distance of the leading

edge of the blade. Two of the threaded blades marked 13 and 14 are detailed below in figure 6.

The example illustrated in figure 3 is a screw-in socket 23 machined in accordance with the invention process and corresponds in its hemispherical shell, its basic dimensions, base hole 31, dome area 28, the edge 27 between the threaded blades and the shell, the base of the thread 30, the diameter 32 and the thread slotting 33 with the example in figure 1. The thread length of the flat thread starts with a reduced tooth height in the first threaded blade 29 which then increases in jumps in the next sequence of four threaded blades until the threaded rib reaches its full height in threaded blade 24. The parallel flanks of each individual threaded blade border in each case on the outerlying section of a cylindrical surface 26 which is coaxial to the screw-in socket axis, whereby the basic cylinder diameter increases in steps from threaded blade to threaded blade. This design principle can also be achieved with a respective section from a correspondingly coaxial screw surface. This design as described forms neither a pinch nor a relief angle at the threaded blades. Indeed a relief angle is absolutely not necessary because the surface roughness (e.g. caused by sand blasting of the screw-in socket surface) creates filing forces which, assuming a neutral relative movement, prevent any sticking during the screw-in process. This means the undesirable formation of a gap between the implant and the bone layer is avoided. Despite this, the front outerlying cutting edge of the threaded blade is effective because it has a larger

radial distance from the socket axis than the leading cutting edge. This results in slightly lower screw-in forces with average tactiliance and improved primary and secondary fixation of the implant.

The example of a hemispherical screw-in socket 34 machined in accordance with the process in accordance with the invention is illustrated in figure 4. Here again the various individual details, i.e. the base hole 42, the dome area 39, the base of the thread 41, the diameter 43 and the thread slotting 44 are the same and unchanged from the previously described examples. In contrast to these, however, the thread described is a pointed thread comprising in principle a triangular thread tooth profile. This fact is not apparent from the two-dimensional drawing. In a similar fashion to above, the thread length commences with an initial small thread blade 40 and the tooth height increases over several stages and reaches its final (average) tooth height at threaded blade 35. The edge (37) formed by the tooth head, which in the case of a pointed triangular cross section of the threaded tooth is practically only a line, comprises for each individual threaded blade a screw line with constant distance from the axis of the screw-in socket which is shown in the diagram only as an curve with a fixed radius to the socket centre. In the case of the pointed thread chosen, the lack of windup of the cutting groove 44 means a cutting edge is formed at both thread tooth flanks. The cutting edge would shift to one of the threaded tooth flanks if the cutting groove had a corresponding wind-up. The surfaces on

both sides of any individual threaded blade of the example shown comprise screw surfaces whereby the pitch of the pole-side surface corresponds with the pitch of the equator-side surface even if the optical impression seems to indicate otherwise because of the socket diameter which increases towards the equator. Because of this, the edge 38 formed at the base of the tooth between the threaded blade and the shell of the screw-in socket appears to run backwards into the shell. After adopting a larger radial distance from the socket axis for the screw surfaces of the next subsequent threaded blade during screwing in, the cutting edges on both side can be either lateral to the thread profile of the leading thread blade or protrude radially outwards and will as such cut easily during screw-in. In this case again, the neutral angle created by the extension of the threaded blades means that the creation of gaps in the contact area to the bone is avoided.

Favorable consideration and early issuance of the Notice of Allowance are respectfully requested.

Respectfully submitted,

Stephan A. Pendorf
Reg. No. 32,665

Pendorf & Cutliff
P.O. Box 20445
Tampa, Florida 33622-0445
(813) 886-6085

Dated: September 23, 2002

U.S. Application No. 09/605,261
AMENDMENT A

Attorney Docket: 3698.008

CERTIFICATE OF MAILING AND AUTHORIZATION TO CHARGE

I hereby certify that the foregoing AMENDMENT A for U.S. Application No. 09/605,261 filed June 28, 2000, were deposited in first class U.S. mail, postage prepaid, addressed: Attn: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on September 23, 2002.

The Commissioner is hereby authorized to charge any additional fees, which may be required at any time during the prosecution of this application without specific authorization, or credit any overpayment, to Deposit Account No. 16-0877.

Stephan A. Pendorf

U.S. Application No. 09/605,261
AMENDMENT A

Attorney Docket: 3698.008

MARKED UP VERSION OF CLAIM AMENDMENTS TO SHOW CHANGES MADE

The Examiner is requested to accept the marked-up version as it is based on the previous version, which when modified as below produces the clean version submitted with the current amendment.

IN THE CLAIMS

Please amend the claims as follows.

27. A screw-in type artificial hip joint socket comprising a shell body having an outer surface, said outer surface having a threaded portion provided thereon with a self-tapping threading for screwing into the acetabulum along a socket axis, the threading on the shell surface defined by ribs divided by cutting grooves (44) into individual blades (35, 36), said blades having a tooth profile which tapers from tooth foot out towards the tooth head, wherein said individual threaded blades are produced as so-called screw surfaces which are generated by the rotation of a certain tooth profile with a pitch around the socket axis with a constant radial distance from the axis of the socket, whereby sequential threaded blades have a larger radial spacing from those preceding them in the direction of screwing.

28. A screw-in type artificial hip joint socket as in claim 27, wherein said individual blades include cutting edges, and wherein the radial distance of the cutting edges from the socket axis is always larger than the corresponding radial distance of

the leading edge of the blade sufficient to achieve a reduction the screw-in forces of the cutting edges.

29. A screw-in type artificial hip joint socket as in claim 27, wherein front outerlying cutting edge of the threaded blade is effective because it has a larger radial distance from the socket axis than the leading cutting edge sufficient to lower screw-in forces with average tactiliance and improved primary and secondary fixation of the implant.

30. A screw-in type artificial hip joint socket as in claim 27, wherein said tooth profiles are trapezoidal, and wherein three screw surfaces are formed, one on the head side and two on the lateral sides, such that these screw surfaces can be shortened in their base area along their extension if the tooth profile runs into the surface shell for certain shell geometries of the screw socket, and such that the surfaces which follow the cutter at the start of the respective threaded blade will then have a neutral angle.

31. A screw-in type artificial hip joint socket according to claim 27, wherein, in order to enable the cutting edge to have the optimum effect at the start of each respective thread blade, said thread blade protrudes compared with the leading threaded blade, by selecting a larger radius for the screw surfaces of each following threaded blade than for the screw surfaces of the preceding thread blade.

U.S. Application No. 09/605,261
AMENDMENT A

Attorney Docket: 3698.008

32. A screw-in type artificial hip joint socket according to claim 27, wherein the individual threaded blades are swivled relative to one another in their extension as a function of the windup of the cutting grooves.

33. A screw-in type artificial hip joint socket according to claim 32, wherein the direction of swivel is one which approaches the windup angle in order to realise an overstand of the lateral cutting edge with a positive cutting angle.

34. A screw-in type artificial hip joint socket according to claim 27, wherein said ribs are angled neutrally or towards the pole of the socket and any constant or variable pitch.

35. A screw-in type artificial hip joint socket according to claim 27, wherein n said tooth as a pointed thread.

36. A screw-in type artificial hip joint socket according to claim 27, wherein said screw-in socket is hemispherical, the thread is a pointed thread comprising in principle a triangular thread tooth profile, wherein the thread length commences with an initial small thread blade and the tooth height increases over several stages and reaches its final (average) tooth height at a threaded blade on the thread nearest the socket pole, wherein the edge formed by the tooth head comprises for each individual threaded blade a screw line with constant distance

from the axis of the screw-in socket, and wherein the edge (38) formed at the base of the tooth between the threaded blade and the shell of the screw-in socket appears to run backwards into the shell and after adopting a larger radial distance from the socket axis for the screw surfaces of the next subsequent threaded blade during screwing in, the cutting edges on both side are either lateral to the thread profile of the leading thread blade or protrude radially outwards and will as such cut easily during screw-in.

37. A screw-in artificial hip joint socket as in claim 27, wherein the outer configuration of the shell surface is spherical, paraspherical, conical, conical-spherical, or parabolic.

38. A screw-in artificial hip joint socket as in claim 27, wherein said thread is a pointed thread angled neutrally or towards the pole of the socket.

39. A screw-in artificial hip joint socket in accordance with claim 27, wherein the threaded blades are swivled relative to one another in their extension with a small angle in the direction of the wind-up angle of the cutting grooves.

40. A screw-in artificial hip joint socket in accordance with claim 39, wherein the swivel is in the direction of the windup of the cutting grooves.

41. A screw-in type artificial hip joint socket comprising a shell body having an outer surface, said outer surface having a threaded portion provided thereon with a self-tapping threading for screwing into the acetabulum along a socket axis, the threading on the shell surface defined by ribs divided by cutting grooves (44) into individual blades (35, 36), said blades having a tooth profile which tapers from tooth foot out towards the tooth head, wherein the threaded rib of the thread has individual threaded blades (100, 101) separated from one another by cutting grooves (102, 103), characterised in that on the individual threaded blades there are cutting edges (105) formed by relicts of the overshoot behaviour of the system in preceding sections, whereby thread blades following in the direction of screw-in have cutting edges which protrude relative to the leading thread blades.

ABSTRACT

A process for hobble or jerk or limp lathing, and preferred process applications, for the cutting of workpieces with non-circular or discontinuous contours on programmable lathes. The use and combination of a special program e.g. of thread cycles and jerk values for the diameter and/or the longitudinal axis or the pitch, the angle of the spindle, in option of a pilgrim-step technique and interleaved machining sequences opens up virtually infinite possibilities. The preferred applications of the process allow special threads to be cut on screw-in bodies, e.g. screw-in artificial hip joint sockets and bone screws for example with neutral or virtually any angle of pitch or relief of the thread blade as well as e.g. internal and external contours on workpieces for circular wedge connections. A particularly beneficial hip joint socket is presented comprising so-called screw or threaded surfaces.